07/01/98

Requirements for

Computer Generated Submittals

to the

Engineering and Design Division

Atlantic Division

Naval Facilities Engineering Command

Engineering and Design Division

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TABLES

GLOSSARY

A&E. Architect & Engineer.

AIA. American Institute of Architects.

BBS. Bulletin Board System.

CADD. Computer Aided Design and Drafting.

CD-r. Recordable Compact Disc.

EFA. Engineering Field Activity.

EFD.	Engineering Field Division.
LANTDIV.	Atlantic Division.
MB.	Megabytes.
MIL-HDBK.	Military handbook.
MIS.	Management Information System.
NAVFAC.	Naval Facilities Engineering Command.
PC.	Personal Computer.
SCSI.	Small Computer Systems Interface.
X-REF.	External reference file.

Section 1: MEDIA TYPE AND FORMAT

1.1 Introduction. The LANTDIV Engineering and Design Division has three computer councils (PC, MIS, and CADD) to develop and maintain policy and to manage information system databases and operation. A subcommittee to the CADD Council, known as the Archive Committee, was created to formulate a vision plan for future digital submittals. The increased volume of both digital and non-digital (paper) data being produced in-house and through A&E submittals, including drawing files, specifications, cost estimates, and other project documentation, has forced us to revisit and update our processes.

Based upon the Archiving Committee's research and recommendations, CD-ROM technology appears to be the most cost effective and efficient method for archiving large databases. LANTDIV's transition to submittal of digital information on recordable compact discs (CD-r) is based on the reduced labor costs, greater storage life and efficiency, increased durability, reduced hardware costs, and the successful acceptance of the technology as an industry format.

This policy will address the form, fit, and functionality issues associated with submitting data on CD-r as a "living solution," compatible with our vision toward the future. Future decisions will be made concerning CADD standards and archiving formats, but we still expect that CD's will become the media of choice. While this policy endorses CD-ROM technology, we will still accept 3.5 inch floppy disks; however, the floppy disk format will eventually fall from favor due to the efficiencies and cost benefits of CD-r storage.

Should you have any questions regarding this policy, feel free to contact the Engineering and Design Division, CADD Council Chairman, Jeff Creekmore, P.E., at (757) 322-4284.

1.2 General Hardware Considerations. CD-recorders are priced depending upon recording speed, options, and bundled software. A small-computer-systems-interface (SCSI) adapter card will be required to support recorder functionality. The CD-r media can be used to store up to 650 MB of data with larger volume formats anticipated in the near future. Early CD-recorders could write at 2X speed. 4X speed versions are readily available for a small premium. Many CD-recorders now come bundled with CD "mastering software" (Corel CD Creator, INCat Easy-CD, etc.) and low end SCSI adapter cards.

1.3 Policy for 3.5 Inch (1.44 MB) Floppy Disk. The most utilized media for submittal and transfer of small amounts of data (1.44 MB maximum) is still the floppy disk. To maintain the use of this technology for the present, and to minimize the transformation shock associated with conversion to new technology, a revised set of floppy disk submittal standards are required. This revised floppy disk submittal strategy will minimize necessary extraction times, provide ideal formats for transferring data, and eliminate the necessity of transferring extraneous extraction software in the submittal.

The following system shall be used in the preparation process when making final submittals on 3.5-inch floppy disks:

Note: Do not arbitrarily compress multiple files for efficiency of storage. If compression is required, follow the prioritized methodology stipulated below utilizing the compression software specified in the paragraph entitled “Acceptable Compression Software (Floppy Disk Only).” File Names should be ISO 9660 compliant using permissible characters as discussed in the paragraph entitled “File Names.” A DOS text file shall be included in all floppy disk submittal packages similar to that discussed in the paragraph entitled “Project Information.”

Priority 1: Use native file formats where possible. In general, files shall remain in their native, uncompressed format, be it AUTOCAD drawing, word processing, cost estimating, or SPECSINTACT. Place as many uncompressed files as possible on a single MS-DOS formatted 1.44 MB floppy disk.

Priority 2: Compressed files shall be in self-extracting (.exe) formats. Avoid compression of multiple files during a single session if the final resulting compressed file is larger than 1.44 MB. Note: Do not use multiple floppy disks to produce a single compression file.

Priority 3: If the compressed version of a single file exceeds the 1.44 MB limit described above, use the “span” option of the compression software to provide file linking across multiple disks. The compression technique for spanned files will be the (.zip) “zipped” format. Refer to paragraph entitled “Acceptable Compression Software (Floppy Disk Only).” Note: Do not use self-extracting (.exe) compression formats for single files spanning multiple floppy disks.

1.4 Acceptable Compression Software (Floppy Disk Only). Acceptable compression software includes WINZIP Version 6.0 and PKZIP Version 2.04g. Future revisions to the software will be acceptable provided backward compatibility is maintained. Disk Spanning is acceptable if performed in accordance with the before mentioned software. PKZIP is a shareware program and can be downloaded from various Internet sites and Bulletin Board Systems (BBS). WINZIP information is available at HTTP://WWW.WINZIP.COM.

1.5 Policy for Recordable Compact Discs (CD-r)

1.5.1 Media Shelf Life. Media shall be 75 year or longer shelf life CD-r's. CD media should be manufactured with a protective coating on the label side surface. Most name brands have the coating but check with your supplier to be sure.

1.5.2 CD Format. CD's shall be recorded in ISO 9660 format.

1.5.3 File Names. File names shall be ISO 9660 compliant. Do not use characters that do not comply with ISO 9660 in any file name or AUTOCAD external reference file because they will be rewritten when the CD is recorded. ISO 9660 Level 1 file names allow capital A to Z, 0 to 9, and the underscore (_) character.

1.5.4 Multisession CD's. Record files in one recording session. Multisession CD's are not acceptable at this time since they are not readable by all CD-ROM's.

1.5.5 Compression. Files on CD's shall be in uncompressed, native format and devoted to a single project.

1.5.6 Project Information. A DOS text file named PROJxxxx.TXT, where "xxxx" is the last four digits of the construction contract number, shall be included in the root directory of the CD. This file will contain pertinent project information including but not limited to the following: project title and location, specification number, construction contract number, A&E firm names (both prime and sub) with applicable addresses and phone numbers, listings of the project design team members, and a listing or table cross-indexing file names to their corresponding directory path, sheet titles, sheet numbers, and NAVFAC and EFD or EFA drawing numbers.

1.5.7 External References. External reference files (X-REF's) shall be included on the CD-ROM. Note: Do not "bind" X-REF's to drawing files.

1.5.8 Specifications. The contract specifications shall be submitted on 3.5 inch floppy disk for each submittal to LANTDIV. The specification shall also be submitted on the project CD when provided. The designer shall transfer the contract specification to the floppy disk through use of the “Backup” command available in SPECSINTACT. Do not create the specifications disk by any other method. The bond specification submitted at the final submittal shall exactly duplicate the electronic specification provided.

1.5.8.1 Submittal Register. At the final submittal, the designer shall provide the submittal register program on a separate 3.5 inch floppy disk. This disk shall be forwarded to the Resident Officer in Charge of Construction (ROICC) and to the contractor for use during construction.

1.5.9 Cost Estimates. The contract cost estimate shall be submitted on 3.5 inch floppy disk for each submittal to LANTDIV. The cost estimate shall also be submitted on the project CD when provided. The cost estimate submitted at the final submittal shall exactly duplicate the electronic cost estimate files provided.

1.5.10 Directory Structure. The exact content, quantity, submittal dates, and milestones for digital submittals are addressed separately in the “Guide for Architect Engineer Firms Performing Services for the Atlantic Division” (the A&E Guide) and specified in the Appendix A project scopes. Although not all directories and associated data are to be included with every submittal, a standard directory structure will be as follows:

/DWG	(for drawings)
/XREF	(for external reference files)
/SPECS	(for project specifications)
/PHOTOS	(for digital photos if available)
/COST_EST	(for cost estimate files)
/OTHER	(for any other pertinent project files)

1.6 Submittal Information and Labeling

1.6.1 Label Content. CD’s and floppy disks shall be labeled with the appropriate project title, project location, LANTDIV job order number, date submitted, construction contract number,

specification number, A&E firm name, drawing numbers (for floppy disks only), the name of the person performing the virus scan, and the date the virus scan was performed. Preferred format for this information is as follows:

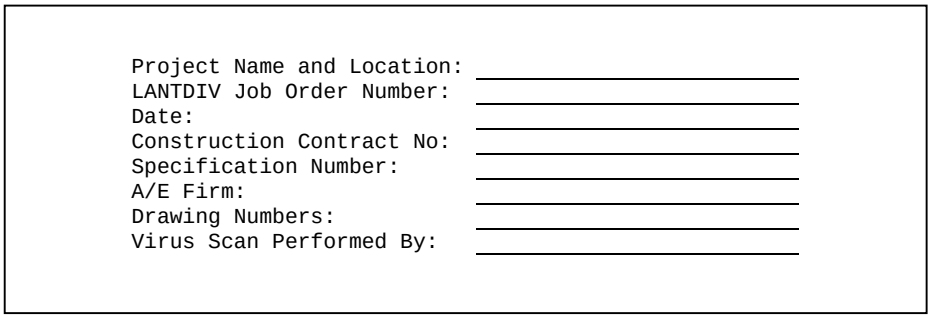

Figure 1-1 Disk Label Information

Note: Media and included data must be scanned for viruses prior to submittal to LANTDIV.

1.6.2 Label Type. CD's are susceptible to damage from adhesive labels. If the label is placed on the CD itself, use special CD labels that are symmetric about the center to eliminate the potential "out-of-balance" conditions at high rotational speeds. Wobble can cause disk errors or damage to the hardware. Use labels with non-solvent based adhesive. These will not damage the disk surface (check with manufacturer). If information is to be manually placed on the disk surface, use a non-solvent based marking pen. Some pens and markers can damage the surface.

1.6.3 Jewel Case. A label with the pertinent job information should be placed on the cover of the jewel case. Extra information can be provided inside the case if desired. CD's should be submitted with a standard protective jewel case designed for a single CD.

Note: There is industry discussion supporting the elimination of any and all forms of markers for direct labeling on CD-r top surfaces. A serial number designation on the unrecorded area circumferentially adjacent to the center hole on the CD-r is being considered as a viable location for labeling. This subject will be addressed conclusively in a later revision to this standard.

1.7 CADD Standards and Directory Structure. The LANTDIV CADD Policy shall be adhered to with respect to preparation of CADD deliverables (drawings), including the correct file naming convention. It should be noted that the last four digits of the construction contract number, not the A&E's contract number, is intended for proper file naming. The acceptable directory structure for submittals is provided in paragraph entitled "Directory Structure." Subdirectories below each of the main directory levels are acceptable (e.g., separation of drawing files by discipline).

Section 2: CADD POLICY

2.1 Purpose. This policy provides guidance and procedures for producing CADD drawings for the Engineering and Design Division, LANTDIV. This policy is to be used in conjunction with the "LANTDIV A&E Guide" and Military Handbook (MIL-HDBK) 1006/7, "Policy and Procedures for Electronic Deliverables of Facilities Computer Aided Design and Drafting Systems (CADD)." Where conflicts arise between these documents, this policy shall govern for design projects. Questions, comments, or suggested revisions to this policy shall be submitted to LANTDIV, Engineering and Design Division, Code 04 for approval.

2.2 Prototype System. The standards set by this policy are based on AUTOCAD Release 12, DOS Version, and AUTOCAD Release 13, Windows, Win95, and WinNT Versions and shall remain in effect through subsequent releases, unless noted otherwise.

2.3 Definitions. The following terms, as used in this policy, are based on standard Engineering and Design Division and AUTOCAD terminology, and may differ from similar terms used in other systems.

Drawing File	Any electronic database created on a CADD System.
Project Drawing File	The final electronic database that contains the information required to create a single drawing. The database may reference other files.
External Reference File	(X-REF): A drawing file that is referenced by more than one project drawing file.
Layers	A system of grouping drawing elements, similar to overlays used in manual drafting.
Block	A group of drawing entities defined to act as a single entity.

2.4 Core Standards. The standards listed in this section are the core standards for the Engineering and Design Division, LANTDIV. The standards that are established in this section should be used when specific standards are not addressed by one

or more disciplines. Discipline specific standards are addressed in subsequent sections.

2.4.1 Support Files. Support files necessary for initializing, editing, and plotting drawing files shall be standard files provided as part of the AUTOCAD software, or files modified by and for the Engineering and Design Division. Copyrighted, third party files shall not be used. Support files include text fonts, hatch patterns, line types, etc.

2.4.2 File names. Project drawing file names shall contain the last four digits of the construction contract number followed by the discipline indicator, and discipline sheet number. X-REF's shall contain an additional indicator, "X," following the discipline indicator(the ".dwg" extension is automatically appended to the file name.)

EXAMPLES:

1234A001.dwg	Last four digits of the construction contract number (e.g., N62470-9x-B-1234), Architectural sheet 1
5678MX01.dwg	Last four digits of the construction contract number (e.g., N62470-9x-B-5678), Mechanical X-REF 1

Discipline indicators:

A	Architectural	N	Instrumentation/Controls
C	Civil	L	Landscaping
D	Demolition $^{\phi}$	M	Mechanical
E	Electrical	P	Plumbing
F	Fire Protection	S	Structural
I	Interior Design	T	Title

ϕ Demolition specific to a single discipline may be placed on individual discipline sheets

2.4.3 Layer Names. The layer naming convention used is based on the “American Institute of Architects (AIA) CADD Layer Guidelines,” long format. The format consists of the following:

Major Group	One character. Discipline indicator (similar to file naming discipline indicators).
Minor Group	Four characters.
Modifier	Four characters.

For more information on layer naming using this format, consult the latest edition of the “AIA CADD Layer Guidelines.”

2.4.3.1 Common Layer Names. The following layer names are common to all disciplines. The discipline indicator used here “X” is to be replaced by the appropriate discipline indicator.

X-DIMS	Dimensions
X-TEXT	Text
X-SYMB	Symbols including detail and section bubbles, graphic scales, north arrows, etc.
X-INFO	General information, not to be plotted
X-MTCH	Match lines
X-SCHD	Schedules
X-DETL	Base layer for details (and sections)
X-DETL-HEVY	Heavy line work for details (.70)
X-DETL-MEDM	Medium line work for details (.50)
X-DETL-LGHT	Light line work for details (.35)
X-DETL-XLIT	Extra light line work for details (.25)
X-DETL-TEXT	Detail text
X-DETL-PATT	DETAIL HATCHING

X-****-DEMO	Demolition for referenced layer
X-****-PATT	Hatching for referenced layer
X-****-TEXT	Text for referenced layer
X-****-EXST	Existing to remain

2.5 Text

2.5.1 Text Fonts. The following text fonts are approved for use on project drawings:

ROMANS	Single stroke Roman font (romans.shx) to be used for standard text. AUTOCAD standard.
ROMAND	Double stroke Roman font (romand.shx) to be used for titles and other large text. AUTOCAD standard.
ROMANT	Triple stroke Roman font (romant.shx) to be used for project titles on cover sheet(s) only. AUTOCAD standard.
HELVETICA	Outlined (not filled) Helvetica font (sasb____.pfb) to be used for project titles on cover sheet(s) only. AUTOCAD Release 12 standard.

Text fonts other than those listed are not to be used unless specifically requested and approved.

2.5.2 Text Height. The minimum text height used shall be .125 inches (in.) for English standard units or 3 millimeters (mm) for metric units. Standard text heights shall be 0.125 in. or 3 mm and shall be used for typical text, notes, dimensions, etc. Large text heights shall be 0.25 in. or 6 mm and shall be used for plan, section, detail, and elevation titles and other miscellaneous headings such as graphic scales, general notes, etc.

2.6 Draw Forms. The standard (English) draw form used is the “D” size drawing with vertical title block. On specific projects, an “F” size draw form may be used if approved by the Engineering and Design Division Director. Draw forms shall be inserted as blocks on layer “0” on each drawing. Draw forms shall not be inserted as X-REF’s.

Metric projects shall use a “D” size drawing with a vertical title block and shall be dimensionally a “soft” metric conversion of the standard English draw form with applicable metric text heights used for sheet titles, etc.

2.7 Colors and Line Weights. AUTOCAD uses color to determine line weight when plotting. The standard color and line weight is based on 16 colors (15 plotting and 1 background color) and four pen weights. The standard assignments for full size plots shall be as follows:

Table 2-1 Colors and Line Weights

Color	Line Weight		Color	Line Weight		Color	Line Weight	
	(mm)	(in.)		(mm)	(in.)		(mm)	(in.)
1 (red)	.50	.020	6 (magenta)	.25	.014	11	.35	.014
2 (yellow)	.35	.014	7 (white)	.25	.014	12	.50	.020
3 (green)	.35	.014	8	.50	.020	13	.70	.028
4 (cyan)	.50	.020	9	.50	.020	14	.25	.010
5 (blue)	.70	.028	10	.35	.014	15	.25	.010

For half size plots, pen weights shall be halved. Color 15 is reserved for gray scale lines used as backgrounds.

2.8 Submittals. In addition to the requirements of the “LANTDIV A&E Guide,” the following requirements shall be met. Compliance with this standard will be verified at each submittal. To accomplish this verification, submittals shall include a minimum of one project drawing, in electronic form, from each discipline. The project size and complexity will determine the actual number of project drawings required at each submittal.

2.8.1 Electronic Media. Electronic submittals shall be in accordance with section entitled “Media Type and Format.”

2.8.2 Plotting Media. Plotting media shall have a minimum thickness of 3 mils. Pre-final submittals shall be plotted on report grade paper. Final submittals shall be plotted on single matte mylar. Plots shall be mirror imaged on the non-matted side to allow pencil or ink changes to be made on the matted side. The plotted image shall be erasable.

2.9 Archiving. Project drawings, X-REF's, and specifications are archived after final approval. Archived files shall meet applicable requirements of this and other applicable LANTDIV standards (Refer to section entitled "Media Type and Format.")

2.10 Engineering and Design Division Bulletin Board. The Engineering and Design Division supports a Bulletin Board System (BBS) which is used to transfer information to and from outside organizations. Information that can be found on the BBS includes branch detail libraries, special specification sections, and Engineering and Design Division standards (including this document). The BBS supports modems up to 28,800 baud, and can be reached by dialing (757) 322-4399.

Note: The A&E firm is responsible for the accuracy and applicability of any detail taken from the Engineering and Design Division bulletin board system. LANTDIV takes no responsibility for problems that arise from the use of these details.

Section 3: SYMBOLS

3.1 Standard Symbols. The symbols shown in Figures 1 and 2 of this section are standard symbols to be used by all disciplines.

3.1.1 Standard Symbols (English). The symbols shown in Figure 1 are for English standard units.

3.1.2 Standard Symbols (metric). The symbols shown in Figure 2 are for metric standard units.

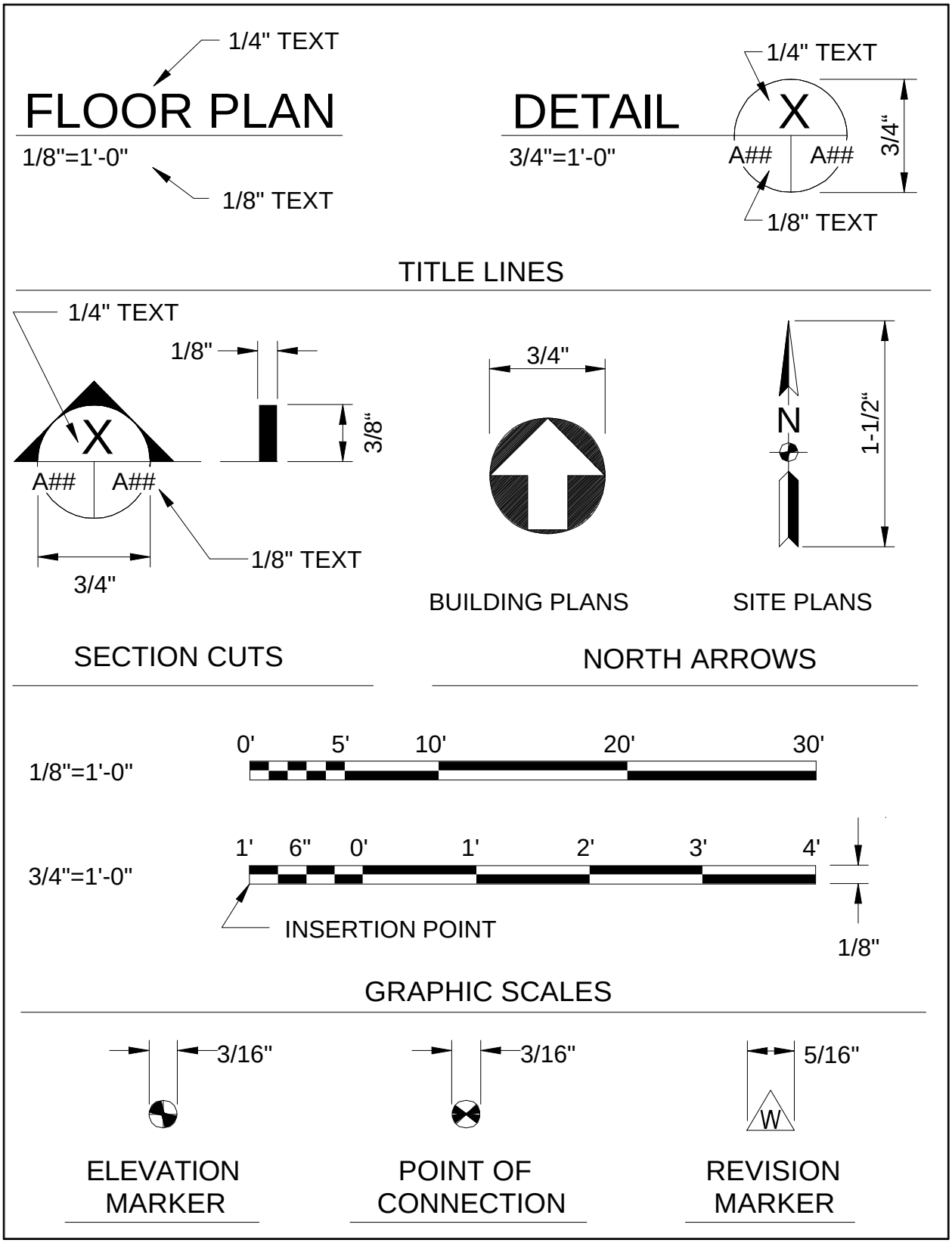

Figure 3-1 Standard Symbols (English)

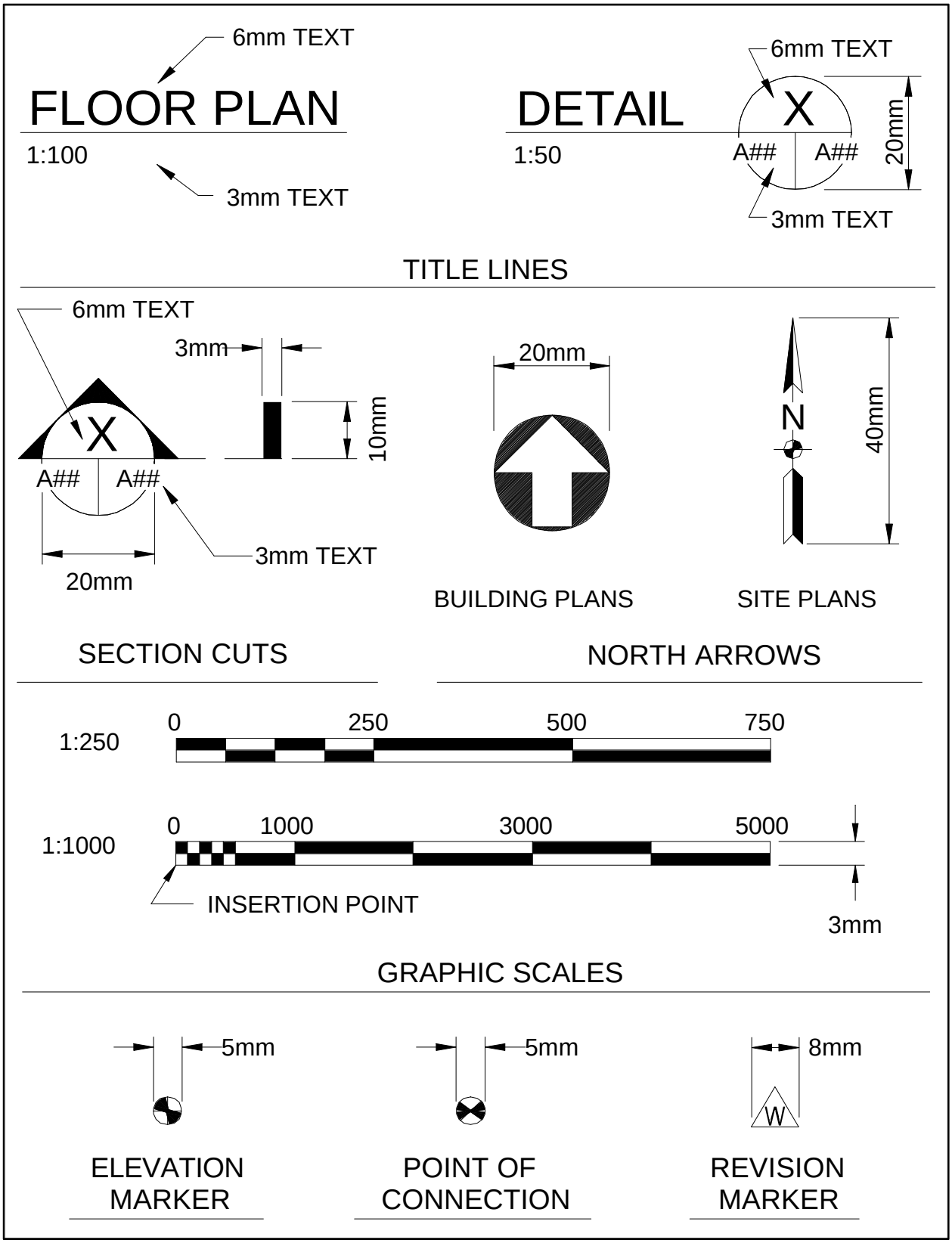

Figure 3-2 Standard Symbols (metric)

Section 4: ARCHITECTURAL STANDARDS

4.1 General. The standards set in this section are for the Architectural Branch of the Engineering and Design Division, LANTNAVFACENGCOM. Standards not addressed in this section shall be taken from Section 2 of this policy entitled “Core Standards.”

4.2 Layer Names

4.2.1 Plan Sheet Layer Base

4.2.1.1 Walls

A-WALL	Base layer for wall information.
A-WALL-ELEV	Wall elevations, 3d modeling.
A-WALL-EXTR	Exterior wall lines.
A-WALL-HEAD	Wall segments above windows and doors (shown on reflected ceiling plans).
A-WALL-INTR	Interior wall lines (load bearing).
A-WALL-JAMB	Wall segments at door and window jambs (not shown on reflected ceiling plans).
A-WALL-PART	Non-load bearing partitions.

4.2.1.2 Doors

A-DOOR	Base layer for door information. Doors shown on this layer.
A-DOOR-ELEV	Door elevations.
A-DOOR-IDEN	Door numbers.
A-DOOR-SWNG	Door swings (certain branches do not want to see door swings on their plans).
A-DOOR-STFT	Storefront systems.

4.2.1.3 Windows, Curtain Walls, and Glazed Partitions

A-WNDW	Base layer for windows.
A-WNDW-ELEV	Window elevations.
A-WNDW-IDEN	Window numbers.
A-WNDW-SILL	Window sills.

4.2.1.4 Ceiling Information

A-CLNG	Base layer for ceiling information.
A-CLNG-GRID	Ceiling grids.
A-CLNG-OPNG	Ceiling and roof penetrations.
A-CLNG-LGHT	Ceiling mounted light fixtures.
A-CLNG-CDFF	Ceiling mechanical diffusers.

4.2.1.5 Floor Information

A-FLOR	Base layer for floor information.
A-FLOR-LEVL	Level changes, ramps, pits, depressions.
A-FLOR-TPTN	Toilet partitions.
A-FLOR-SPCL	Architectural specialties (toilet accessories, display cases, fire extinguishers.)
A-FLOR-WDWK	Woodwork and casework (field built aND manufactured cabinets, counters.)
A-FLOR-RAIS	Raised access floor.
A-FLOR-EVTR	Elevator cab and equipment.
A-FLOR-RISR	Stair risers.
A-FLOR-HRAL	Stair and balcony handrails.
A-FLOR-IDEN	Room numbers.

A-FLOR-TEXT	Room names.

4.2.1.6 Roof

A-ROOF	Base layer for roof information.
A-ROOF-LEVL	Changes in roof level or change in slope.
A-ROOF-STRS	Roof stairs and ladders.

4.2.1.7 Exterior and Interior Elevations

A-ELEV	Base layer for elevation information.
A-ELEV-OTLN	Elevation outline.
A-ELEV-SIGN	Signs.
A-ELEV-CASE	Wall-mounted casework.

4.2.1.8 Equipment

A-EQMT	Base layer for equipment.
A-EQMT-NINC	Equipment that is not in contract.

4.2.1.9 Furniture

A-FURN	Base layer for furniture.
A-FURN-FREE	Freestanding furniture.
A-FURN-FILE	File cabinets.
A-FURN-CHAR	Chairs and other seating.
A-FURN-PNLS	Furniture system panels.
A-FURN-WKSF	Furniture system work surface components.
A-FURN-STOR	Furniture system storage components.
A-FURN-POWR	Furniture system power designations.
A-FURN-ELEV	Furniture system elevations.

4.2.2 Detail and Section Layer Base

4.2.2.1 Details

A-DETL	Base layer for details and sections.
A-DETL-HEVY	Heavy lines in details.
A-DETL-MEDM	Medium lines in details.
A-DETL-LGHT	Light lines in details.
A-DETL-XLIT	Extra light lines in details.
A-DETL-TEXT	Text used in details.

4.2.3 Landscaping

L-PLNT	Plant and landscape materials.
L-PLNT-DEMO	Existing to be removed.
L-PLNT-EXST	Existing to remain.
L-IRRG	Irrigation system.
L-IRRG-EQPT	Irrigation equipment.
L-PLNT-PIPE	Irrigation piping.
L-PLNT-SPKL	Irrigation sprinklers.
L-WALK	Sidewalks and steps.
L-SITE	Site improvements.
L-SITE-PLAY	Play structures.
L-SITE-FURN	Site furnishings.
L-SECT	Sections.
L-SECT-HEVY	Heavy line for a section cut.
L-SECT-MEDM	Medium line for a section cut.
L-SECT-LGHT	Light line for a section cut.

L-SECT-XLIT	Extra light line for a section cut.
L-SECT-TEXT	Text used in a section.
L-DETL	Details
L-DETL-HEVY	Heavy lines in details.
L-DETL-MEDM	Medium lines in details.
L-DETL-LGHT	Light lines in details.
L-DETL-XLIT	Extra light lines in details.
L-DETL-TEXT	Text used in details.

4.2.4 General Information Layers

VIEW Viewports, a non-plot layer.

A-DIMS	Dimensions.
A-TEXT	Text
A-SYMB	Symbols (detail and section cut symbols, north arrows, graphic scales).
A-INFO	General information layer, a non-plot layer.
A-MTCH	Match lines.
A-SCHD	General schedule layer. May be used in lieu of separate layers for different schedule types.
A-SCHD-FINS	Finish schedule (optional).
A-SCHD-DOOR	Door schedule (optional).
A-SCHD-WNDW	Window schedule (optional).
A-SCHD-LUVR	Louver schedule (optional).
A-****-DEMO	Demolition for the layer referenced.
A-****-EXST	Existing to remain.

A-****-SYMB	Symbols for the layer referenced.
A-****-PATT	Pattern hatch for the layer referenced.
A-****-IDEN	Reference number or symbol for referenced layer, (e.g., A-DOOR-IDEN.)
A-****-TEXT	Text associated with a specific building system as necessary, (e.g., A-SCHD.) (A-TEXT would normally be used for general text.).

4.2.5 Other Discipline Layers Used

S-COLS	Structural columns.
S-GRID	Column grid.
M-EQPM	Mechanical equipment.
M-EQPM-ROOF	Mechanical roof-mounted equipment.
M-HVAC-DIFF	Mechanical ceiling diffusers.
P-FIXT	Plumbing fixtures.
P-SANR-FLDR	Floor drains and floor slabs.
E-COMM	Electrical telephones and communications.
E-LITE-SITE	Electrical site lighting.
E-PANL	Electrical power panels.
E-POWR	Electrical power and receptacles.
C-PVMT	Civil parking lots, striping, roads.
C-CONT	Civil contours.
C-BLDG	Civil building footprint.

Section 5: STRUCTURAL STANDARDS

5.1 General. The standards set in this section are for the Structural Branch of the Engineering and Design Division, LANTDIV. Standards not addressed in this section shall be taken from paragraph entitled “Core Standards.”

5.2 Layer Names

5.2.1 Foundations

S-FNDN	Foundation plans.
S-FNDN-PILE	Foundation piles.
S-FNDN-PCAP	Pile caps.
S-FNDN-GDBM	Grade beams.
S-FNDN-RBAR	Reinforcing steel.
S-FNDN-PATT	Hatch patterns.

5.2.2 Slabs

S-SLAB	Slab plans.
S-SLAB-JOIN	Slab joints.
S-SLAB-RBAR	Slab reinforcing.
S-SLAB-PATT	Slab hatch patterns.

5.2.3 Framing

S-FRAM	Framing plans.
S-FRAM-BEAM	Framing beams.
S-FRAM-JOIS	Bar joists.
S-FRAM-DECK	Metal deck.
S-FRAM-RBAR	Reinforcing.
S-FRAM-OPNG	Framing opening.

5.2.4 Sections and Details

S-DETL-XLIT	Extra light object lines (.25).
S-DETL-LGHT	Light object lines (.35).
S-DETL-MEDM	Medium object lines (.50).
S-DETL-HEVY	Heavy object lines (.70).
S-DETL-PATT	Section hatch.
S-DETL-TEXT	Section text.

5.2.5 General Information

S-TEXT	Text including titles.
S-DIMS	Dimensions.
S-SYMB	Symbols, north arrow, graphic scales.
S-SCHD	Schedules, tables.
S-AWSS	Welding symbols.
S-MTCH	Match lines.
S-INFO	General information (not to be plotted).
S-COLS	Columns.
S-GRID	Column grid.
S-PATT	Hatch patterns.

Section 6: MECHANICAL STANDARDS

6.1 General. The standards set in this section are for the Mechanical Branch of the Engineering and Design Division, LANTDIV. Standards not addressed in this section shall be taken from paragraph entitled “Core Standards.”

6.2 Layer Names

6.2.1 Equipment

M-EQPM	General equipment.
M-EQPM-MPAD	Equipment mounting pad.
M-EQPM-SUPT	Equipment support.
M-EQPM-ROOF	Mechanical roof-mounted equipment.

6.2.2 Piping

M-CAIR	Compressed air.
M-CDRN	Condensate drain.
M-CHWR	Chilled-hot (dual temperature) water.
M-CHWR-SPLY	Chilled-hot water supply.
M-CHWR-RETN	Chilled-hot water return.
M-CWTR	Chilled water.
M-CWTR-SPLY	Chilled water supply.
M-CWTR-RETN	Chilled water return.
M-FOIL	Fuel oil.
M-FUEL	Fuel piping.
M-HWTR	Hot (heating) water.
M-HWTR-SPLY	Hot water supply.
M-HWTR-RETN	Hot water return.
M-MGAS	Medical gases.

M-PIPE	Miscellaneous or general piping.
M-PROC	Process piping.
M-REFG	Refrigerant piping.
M-STEM	Steam piping.
M-STEM-AGND	Steam piping above ground.
M-STEM-UGND	Steam piping underground.
M-STMC	Steam condensate piping.

6.2.3 Heating, Ventilation, and Air Conditioning (HVAC)

M-CONT	Controls.
M-DUCT	General ductwork.
M-DUCT-SPLY	Supply ductwork.
M-DUCT-RETN	Return ductwork.
M-DUCT-EXHS	Exhaust ductwork.
M-DUCT-****	Ductwork for the miscellaneous sub-layer referenced.
M-DUST	Dust collection systems.
M-EXHS	Exhaust systems.
M-HVAC	General HVAC systems.
M-HVAC-DIFF	Diffusers, registers, grilles.
M-SPEC	Special systems.

6.2.4 General

M-TEXT	Text.
M-TEXT-HEVY	Heavy text.
M-DETL	Detail (detail graphics).
M-DETL-LGHT	Light detail graphics.
M-DETL-HEVY	Heavy detail graphics.

	M-SYMB	Graphics (miscellaneous symbols, etc.).
	M-****-DEMO	Demolition.
	M-****-EXST	Existing.
	M-****-NEWK	New work.
	M-ELEC	Electrical.

6.2.5 Plumbing

P-ACID	Acid waste piping.
P-CAIR	Compressed air.
P-DOMW	Domestic water.
P-DOMW-HOTW	Domestic hot water.
P-DOMW-COLD	Domestic cold water.
P-DOMW-HOTR	Domestic hot water return.
P-EQPM	Equipment.
P-FIXT	Plumbing fixtures.
P-SANR	Sanitary.
P-SANR-FLDR	Floor drains and floor sinks.
P-STRM	Storm water.

Section 7: ELECTRICAL STANDARDS

7.1 General. The standards set in this section are for the Electrical Branch of the Engineering and Design Division, LANTDIV. Standards not addressed in this section shall be taken from paragraph entitled “Core Standards.”

7.2 Layer Names

E-1LIN	One-lines.
E-1LIN-TEXT	One-line text.
E-CATV	Television system.
E-COMM	Telephone, communications.
E-DETL	Details, plates.
E-DETL-PATT	Hatch patterns on details.
E-DETL-TEXT	Detail text.
E-GRND	Grounding.
E-INFO	Non-plot information layer.
E-INTC	Intercom.
E-LEGN	Legend.
E-LITE	Lighting.
E-LITE-SITE	Site lighting.
E-LTNG	Lightning protection.
E-MECH-EQPM	Mechanical equipment.
E-MTCH	Match lines.
E-OVHD	Overhead utilities.
E-OVHD-EXST	Existing overhead.
E-PANL	Power panels.
E-PANL-EXST	Existing power panels.

E-POWR	Power, receptacles.
E-RISR-COMM	Communication, telephone riser.
E-RISR-POWR	Power riser.
E-RISR-SERT	Security/intrusion detection system riser.
E-RISR-SOUN	Public address/sound systems riser.
E-RISR-****-TEXT	Riser text.
E-SCHD	Schedules.
E-SCHD-TEXT	Schedule text.
E-SERT	Security.
E-SOUN	Sound systems.
E-SYMB	Graphic scales, north arrows.
E-TEXT	Titles, notes, etc.
E-UNDR	Underground utilities.
E-UNDR-EXST	Existing underground.
F-ALRM-ADDR	Fire alarm system addressable point.
F-ALRM-INDC	Fire alarm indicating devices.
F-ALRM-INIT	Fire alarm initiating devices.
F-ALRM-RISR	Fire alarm system riser.
F-ALRM-SCHD	Fire alarm system schedule.
F-ALRM-TEXT	Fire alarm system text, notes, etc.
F-DETL	Fire alarm detail.
F-DETL-TEXT	Fire alarm detail text.

7.3 Other Discipline Layers Used

A-DOOR	Base layer for door information. Doors shown on this layer.
A-FLOR	Base layer for floor information.
A-FLOR-IDEN	Room numbers.
A-FURN	Base layer for furniture.
A-CLNG-GRID	Ceiling grids.
A-WALL-EXTR	Exterior wall lines.
A-WALL-INTR	Interior wall lines load bearing.
A-WALL-PART	Non-load bearing partitions.
C-BLDG	Buildings.
C-BLDG-DEMO	Buildings to be demolished.
C-BLDG-EXST	Existing buildings to remain.
C-PVMT	Parking, roads, aprons, runways, etc.
S-COLS	Columns.
S-COLS-CNTR	Column centerlines.
S-GRID	Column grid.

Section 8: CIVIL STANDARDS

8.1 General. The standards set in this section are for the Civil Branch of the Engineering and Design Division, LANTDIV. Standards not addressed in this section shall be taken from paragraph entitled “Core Standards.” If the complete drawing is done in AUTOCAD, minimum text size may be 0.1 inch high (English) or 2.5 mm high (metric) for existing features only.

8.2 Layer Names

8.2.1 Site Information

C-BLDG	Buildings.
C-CONT	Contours.
C-ELEV	Spot elevations.
C-PROP	Property, baselines.
C-PVMT	Parking, roads, aprons, runways, etc.
C-TOPO	Topographic features, trees, fences, etc.
C-PADS	Footprint of Mechanical and electrical equipment pads.
C-DRDG-****	Dredging layers (various).

8.2.2 Utility Information

C-SSWR	Sanitary sewers.
C-STRM	Storm sewers.
C-WATR	Water lines.

8.2.3 Other Discipline Layers Used

E-COMM	Telephone, communications.
E-OVHD	Overhead electrical utilities.
E-UNDR	Underground electrical utilities.

E-LITE-SITE	Site lighting.
M-STEM	Steam piping.

8.2.4 Possible Additions and Secondary Level Modifiers

C-****-PROF	Profile.
C-****-PROF-GRID	Profile grid.
C-****-PROF-EXST	Profile, existing.
C-****-PROF-NEW	Profile, new.
C-****-XSEC	Cross-section.

8.2.5 General Information Layers

C-XTRA	Extra items not shown on final drawing.
C-****-INFO	General information layer.

Section 9: FIRE PROTECTION STANDARDS

9.1 General. The standards set in this section are for the Fire Protection Branch of the Engineering and Design Division, LANTDIV. Standards not addressed in this section shall be taken from paragraph entitled “Core Standards.”

9.2 Layer Names

9.2.1 Fire Alarm System

F-ALRM	Base layer for fire alarm system information.
F-ALRM-ADDR	Fire alarm system addressable point.
F-ALRM-INDC	Fire alarm indicating devices.
F-ALRM-INIT	Fire alarm initiating devices.
F-ALRM-RISR	Fire alarm system riser diagram.
F-ALRM-SCHD	Fire alarm system schedule.
F-ALRM-TEXT	Fire alarm system text, notes, etc.

9.2.2 Gaseous Fire Protection System

F-GASS	Base layer for gaseous system information.
F-GASS-EQPM	Gaseous system equipment.
F-GASS-PIPE	Gaseous system piping.
F-GASS-TEXT	Gaseous system text.

9.2.3 Details and Sections

F-DETL	Base layer for fire protection details.
F-DETL-PATT	Fire protection detail patterns.
F-DETL-TEXT	Fire protection detail text, notes, etc.

9.2.4 Elevations

F-ELEV	Base layer for fire protection elevations.
F-ELEV-PATT	Fire protection elevation patterns.
F-ELEV-TEXT	Fire protection elevation text, notes, etc.

9.2.5 Foam System

F-FOAM	Base layer for foam system information.
F-FOAM-EQPM	Foam system equipment.
F-FOAM-PIPE	Foam system piping.
F-FOAM-TEXT	Foam system text, notes, etc.

9.2.6 Fire Protection System

F-PROT	Base layer for miscellaneous fire protection systems.
F-PROT-EQPM	Fire protection system equipment.
F-PROT-TEXT	Fire protection system text, notes, etc.

9.2.7 Sprinkler System

F-SPRN	Base layer for sprinkler system information.
F-SPRN-CLHD	Ceiling sprinkler heads.
F-SPRN-EQPM	Sprinkler system equipment.
F-SPRN-OTHD	Other sprinkler heads, nozzles, etc.
F-SPRN-PIPE	Sprinkler system piping.
F-SPRN-RISR	Sprinkler system riser diagram.
F-SPRN-TEXT	Sprinkler system text, notes, etc.

9.2.8 Fire Pumps

F-PUMP	Base layer for fire pump information.
F-PUMP-DIMS	Fire pump dimensions.
F-PUMP-EQPM	Fire pump equipment.
F-PUMP-PIPE	Fire pump layout.
F-PUMP-SCHD	Fire pump and jockey pump schedule.
F-PUMP-SCHM	Fire pump schematic.
F-PUMP-TEXT	Fire pump text, notes, etc.

9.2.9 Standpipe System

F-STAN	Base layer for standpipe system information.
F-STAN-EQPM	Standpipe system equipment.
F-STAN-PIPE	Standpipe system piping.
F-STAN-TEXT	Standpipe system text, notes, etc.

9.2.10 General Information Layers

F-DIMS	Dimensions, etc.
F-IDEN	Detail titles, etc.
F-SYMB	Symbols, detail, section cuts, etc.
F-TEXT	Text, notes, etc.

Section 10: GEOTECHNICAL STANDARDS

10.1 General. The standards set in this section are for the Geotechnical Branch of the Engineering and Design Division, LANTDIV. Standards not addressed in this section shall be taken paragraph entitled “Core Standards.”

10.2 Layer Names

10.2.1 Site Information

C-TOPO	Test borings.
C-TOPO-TEXT	General Notes and Text